

Partial home confinement during the COVID-19 pandemic, physical function, and physical activity in patients with symptomatic lower extremity peripheral artery disease

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The coronavirus disease 2019 (COVID-19) pandemic has forced people to stay at home and change their daily activity habits. This has severely increased physical inactivity, generating a rapid unfavorable neuromuscular and cardio-metabolic condition leading to decreased physical function.¹ As exercise is first-line therapy in symptomatic patients with symptomatic lower extremity peripheral artery disease (PAD),^{2–5} these individuals could be particularly affected during the COVID-19 pandemic.

In Switzerland, measures to counteract the spread of COVID-19 were ‘light’ (partial confinement with no prohibition on leaving home). However, the impact of partial confinement on physical function and physical activity in patients with symptomatic PAD remains to be determined.

This study investigated the impact of partial confinement on physical function and physical activity in patients with PAD who previously completed a supervised exercise training (SET) program. We hypothesized that physical function and activity would be decreased post-partial compared to pre-partial confinement.

Symptomatic patients with PAD having completed a 3-month SET program⁶ were included in the study. Following SET, patients have three follow-up (FU) visits: post-SET, 6 months (FU6), and 12 months (FU12). Patients were divided into two groups. (1) Study group (SG): patients who completed SET between November 2018 and February 2020, and underwent either the post-SET, FU6, or FU12 between November 2019 and February 2020 (pre-partial confinement visit); these patients were all seen again at the end of the partial confinement period (May/June 2020). In the Vaud canton, between March 16 and May 11, the Swiss government decided to close restaurants, bars, non-essential shops, libraries, theatres, cinemas, and fitness centers. During this period, there was no strict prohibition to move from home, but people were strongly encouraged to stay at home as much as possible, to maintain social distancing, and avoid meeting with more than five people. (2) Comparator group (COMP): patients who completed SET

between October 2016 and September 2018 and underwent the post-SET as well as FU6 and FU12 by September 2019.

The study was approved by the local ethics committee and was conducted according to the Declaration of Helsinki. Informed consent was obtained for all participants.

Physical function was assessed using a 6-minute walk test to determine the 6-minute walking distance (6MWD),⁷ the short physical performance battery (SPPB),⁸ and the stair climbing test (SCT).⁹ During the consultation, patients in the SG were asked to recall their physical activity behavior 4 weeks before and during partial confinement. Three domains were investigated: (1) walking for exercise; (2) other exercise modalities (cycling, resistance training, swimming, gym); and (3) daily physical activities (household, childcare, gardening, or other activities reported by the patients). The mean number of minutes per week practiced in each of these domains was assessed.

Owing to missing data, linear mixed models (group (SG vs COMP) × time (before SET vs pre-partial confinement/FU6 vs post-partial confinement/FU12)) were performed (Table 1). When a significant interaction effect was revealed, significance was determined using multiple comparisons.

Thirty-three symptomatic patients with PAD were included (SG ($n = 16$; 68.4 ± 2.3 y, 26.4 ± 1.4 kg·m⁻², ankle-brachial index (ABI): 0.81 ± 0.05); COMP group ($n = 17$; 63.4 ± 2.5 y, 28.0 ± 1.3 kg·m⁻², ABI: 0.82 ± 0.04)). None of the patients in the SG had symptoms of COVID-19 or had any new health-related diseases. Also, no patients had supervised exercise intervention during the

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Table 1. Physical function in the study group and comparator group.

Variable	Study Group			Comparator Group			Time effect	Group × time		
	Before SET	Pre-partial confinement	Post-partial confinement	Mean difference (post – pre partial confinement)	Before SET	FU6			FU12	Mean difference (FU12 –FU6)
6MWD (m)	428.4 ± 17.6 (n = 16)	470.4 ± 18.8 ^a (n = 16)	440.2 ± 23.9 ^b (n = 15)	-31.6 ± 11.9	433.5 ± 17.0 (n = 17)	465.8 ± 22.4 ^a (n = 17)	459.3 ± 23.5 ^a (n = 15)	3.8 ± 6.0	≤ 0.001	0.050
Performance on 12-stair flight (SCT, s)	6.9 ± 0.4 (n = 16)	6.0 ± 0.5 (n = 16)	6.6 ± 0.5 (n = 14)	0.6 ± 0.2	6.4 ± 0.5 (n = 17)	5.3 ± 0.5 (n = 17)	5.3 ± 0.5 (n = 15)	-0.1 ± 0.1	≤ 0.001	0.089
SPPB score	10.5 ± 0.3 (n = 16)	11.6 ± 0.2 (n = 16)	10.9 ± 0.3 (n = 14)	-0.6 ± 0.2	10.9 ± 0.3 (n = 17)	11.6 ± 0.2 (n = 17)	11.3 ± 0.3 (n = 15)	-0.3 ± 0.2	≤ 0.001	0.540

Values are presented as means ± SE.

Data were compared between SET and pre- and post-partial confinement for the SG, and between before SET and 6 and 12 months' follow-up for the COMP group. Mean difference was calculated for each participant using paired data. Statistical analyses were performed with IBM SPSS Statistics, Version 26 (IBM Corp., Armonk, NY, USA).

^a $p \leq 0.05$ for significant difference (multiple comparisons with Bonferroni adjustment) to before SET.

^b $p \leq 0.05$ for significant difference (multiple comparisons with Bonferroni adjustment) to pre-partial confinement in the SG group.

FU6 and FU12, follow-up visits 6 and 12 months after SET; SCT, stair climbing test; SET, supervised exercise training; 6MWD, 6-minute walking distance; SPPB score, Short Physical Performance Battery score.

pandemic period. Nine patients had their post-partial confinement assessment 4–8 months after SET; four patients had their post-partial confinement assessment 8–12 months after SET; three patients had their post-partial confinement assessment 13–19 months after SET. During partial confinement, 13 patients (81%) reported strictly following the Swiss government recommendations, limiting their lifestyle behavior. Three patients reported their behavior was similar to that prior to partial confinement.

There was a significant time effect and time × group interaction effect for the 6MWD (Table 1). In the SG, multiple comparison analysis revealed that the 6MWD pre-partial confinement was significantly longer than before SET (Table 1, $p \leq 0.001$). The 6MWD post-partial confinement was significantly lower than pre-partial confinement (Table 1, $p = 0.007$). The 6MWD post-partial confinement was not significantly different compared to before SET (Table 1). In the COMP group, multiple comparison analysis revealed that the 6MWD at FU6 and FU12 was significantly greater than before SET (Table 1, $p \leq 0.006$). There was a significant time effect without time × group interaction effect for SCT and for SPPB (Table 1). Compared to pre-partial confinement, patients in the SG reported a decreased number of minutes of walking for exercise (pre-partial confinement: 317 ± 110 min vs post-partial confinement: 188 ± 62 min, -41%), of other exercise modalities (47 ± 23 min vs 45 ± 24 min, -4%), and of other daily physical activities (296 ± 100 min vs 201 ± 68 min, -32%) per week.

The significantly shorter 6MWD post-partial confinement in the SG represents a clinically meaningful decrease in walking ability since it has recently been shown that an ~24 m decrease in 6MWD corresponds to a self-perceived large decline in patients with PAD.¹⁰ In contrast, benefits were maintained in the COMP group, suggesting that changes observed in the SG might be linked to COVID-19-related partial confinement. On the other hand, no differences were observed between groups for lower limb function (SCT and SPPB). Therefore, these results suggest a greater impact of partial confinement on aerobic capacity and walking endurance.

Some limitations exist: (1) our sample size was small; (2) there was a variation in the post-partial confinement assessment in relation to the previous SET period; (3) it cannot be ruled out that our findings in the SG were merely due to natural deterioration in physical function over time; (4) physical activity data were not objectively measured and a non-validated questionnaire was used; and (5) data on self-reported physical activity and walking for exercise are lacking for the COMP group.

In conclusion, compared to a group of patients with PAD who underwent SET between October 2016 and September 2018, we found that physical function was more affected in patients with PAD who underwent SET but experienced partial confinement. This was probably linked to physical inactivity.

Declaration of conflicting interests

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